

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* DONALD B. APPLEBY, DAVID J. BRONO JR.,  
PATRICK J. CORRIGAN, JOHN K. HOWIE, JU-NAN KAO,  
SCOTT D. PEARSON, RICHARD G. SCHAFERMEYER,  
and GLEN R. WYNES

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Appeal 2006-3258  
Application 08/360,184  
Technology Center 1600

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Decided: May 29, 2007

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Before ERIC GRIMES, LORA M. GREEN, and RICHARD M. LEBOVITZ, *Administrative Patent Judges*.

GREEN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1, 5, 6, 8, 9, 13-15, 23, 27, 28, 30, 43-

45, 48, 51, 54, 55, and 62.<sup>1</sup> We have jurisdiction under 35 U.S.C. § 6(b).

Claims 1 and 62 are representative of the claims on appeal, and read as follows:

1. A continuous process for preparing highly esterified polyol fatty-acid polyester by interesterifying polyol containing more than about four esterifiable hydroxy groups and fatty-acid ester of easily removable alcohol in a heterogenous reaction mixture wherein

- a) a catalyst is used in the reaction mixture at an initial level of from about 0.01 to about 0.5 mole of catalyst per mole of polyol;
- b) a soap emulsifier is used in the initial stage of the process at a level of from about 0.001 to about 0.6 mole of soap per mole of polyol;
- c) the molar ratio of total ester reactant to each esterifiable hydroxy group of the polyol in the reaction mixture ranges from about 0.9:1 to about 1.2:1;
- d) the temperature in the initial stage of the process ranges from about 130°C to about 140°C, and in the final stages of the process from about 80°C to about 120°C; and
- e) easily removable alcohol is removed from the reaction mixture as the interesterifying reaction proceeds; and wherein the initial stage of the interesterifying reaction is carried out in a continuous manner under conditions of backmixing suitable for maintaining within said reaction mixture a level of lower partial fatty acid esters of said polyol that is sufficient to emulsify said reaction mixture.

62. In a continuous process for preparing highly esterified polyol fatty acid polyester by interesterifying polyol containing more than four esterifiable hydroxy<sup>2</sup> groups and fatty acid ester of an easily removable alcohol in a heterogenous reaction mixture wherein said easily removable alcohol is removed from said reaction mixture as the reaction proceeds, the improvement which comprises:

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<sup>1</sup> Claims 63-118 are also been pending, but have been indicated as allowable by the Examiner (Br. 2).

<sup>2</sup> The Appendix to the Appeal Brief has “hydroxyl” here, but in the Amendment to the claims, dated March 9, 2004, it appears as “hydroxy,” and that is what we have used here.

(A) carrying out an initial stage of the interesterifying reaction in a continuous manner under conditions of backmixing suitable for maintaining within said reaction mixture a level of lower partial fatty acid esters of said polyol that is sufficient to emulsify said reaction mixture; and

(B) carrying out at least a final stage of the interesterifying reaction in a continuous manner under conditions approaching plug-flow conditions after the degree of esterification of said polyol has reached at least about 50%.

Claims 1, 5, 6, 8, 9, 13-15, 23, 27, 28, 30, 43-45, 48, 51, 54, 55, and 62 stand rejected under 35 U.S.C. § 103(a) as being obvious over the combination of Willemse<sup>3</sup> or Volpenhein<sup>4</sup> as combined with Balint '461,<sup>5</sup> Balint '368,<sup>6</sup> Setzler<sup>7</sup> or Mansour.<sup>8</sup>

We reverse.

#### DISCUSSION

The Examiner relies on Willemse for teaching “a process for the synthesis of polyol fatty acid polyesters comprising a two-stage transesterification of polyol to polyester.” (Answer 5). Willemse is cited for teaching “a process wherein a substantially solvent-free complete reaction mixture of a polyol, optionally in admixture with fatty acid oligoesters thereof, fatty acid lower-alkylester, a transesterification catalyst, and optionally an emulsifier, is caused to react under transesterification conditions of elevated temperature and reduced pressure, said pressure being controlled such that in an initial stage (1) said polyol is esterified to a degree

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<sup>3</sup> Willemse, U.S. Patent No. 4,973,682, issued November 27, 1990.

<sup>4</sup> Volpenhein, U.S. Patent No. 4,517,360, issued May 14, 1985.

<sup>5</sup> Balint, U.S. Patent No. 3,689,461, issued September 5, 1972.

<sup>6</sup> Balint, U.S. Patent No. 3,679,368, issued July 25, 1972.

<sup>7</sup> Setzler, Jr., U.S. Patent No. 3,567,396, issued March 2, 1971.

<sup>8</sup> Mansour, U.S. Patent No. 4,449,828, issued May 22, 1984.

of conversion within the range of 10 to 50% substantially without leaving non-participating polyol, and in a subsequent final stage (2) the reaction is caused to proceed to a degree of conversion of at least 70%.” (*Id.*)

According to the Examiner, “Willemse discloses that both stages of the transesterification can be carried out at a similar temperature, which normally lies within the range of from 100° to 180°C.” (*Id.*) Willemse is also relied on for teaching “that the process can be carried out in a continuous or semi-continuous operation.” (*Id.* at 6.)

Volpenheim is cited for teaching “a transesterification process for synthesizing polyol fatty acid polyesters comprising the steps (1) heating a mixture of (a) a polyol selected from the group consisting of monosaccharides, disaccharides and sugar alcohols, (b) a fatty acid ester selected from the group consisting of methyl esters, 2-methoxy ethyl esters, benzyl esters and mixtures thereof, (c) an alkali metal fatty acid soap, and (d) a basic catalyst, to a temperature of from about 110°C to about 180°C at a pressure of from about 0.1 mm to about 760 mm of mercury to form a homogenous melt; and (2) subsequently adding to the reaction product of step (1) excess fatty acid ester . . . .” (*Id.*)

The Examiner acknowledges that “[t]he instant claims differ from the Willemse and Volpenheim patents by claiming that the process is carried out under conditions of backmixing suitable for maintaining within said reaction mixture a level of lower partial fatty acid esters of said polyol that is sufficient to emulsify said reaction mixture.” (*Id.* at 7).

Balint '461 is cited for teaching “a process for the preparation of linear condensation polyesters from a polycarboxylic acid and a polyol which can be carried out in a continuous or discontinuous process” (Answer

7). The Examiner cites Figure 1 as suggesting “a process whereby the reaction is carried out under plug flow conditions by feeding the output of the initial stage into a series of at least two continuous stirred tank reactors.” (*Id.*) According to the Examiner, Example 2, which refers to Figure 1, “describes a process whereby part of the partially esterified material which is produced is returned to the inlet of the circulating pump to be combined with fresh paste [which] appears to be within the scope of the backmixing step claimed in the instant application.” (*Id.*)

Balint '368, Setzler and Mansour are cited for demonstrating “that the preparation of products in a continuous operation under conditions of backmixing and plug flow is well known in the art” (Answer 7).

The Examiner concludes:

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Willemse and Volpenheim's process for preparing polyol fatty acid polyesters by applying the various conditions under which the process is to be carried out as suggested by Balint '461, Balint [ ] '368, Setzler and Mansour all of which teach carrying out a process in a continuous operation and under conditions of backmixing and plug flow, since such process steps for preparing polyol polyester and such conditions for the operation of a continuous process increases the quality and quantity of the desired product.

(*Id.*)

“In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness. Only if that burden is met, does the burden of coming forward with evidence or argument shift to the applicant.” *In re Rijckaert*, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993) (citations omitted). The test of

obviousness is “whether the teachings of the prior art, taken as a whole, would have made obvious the claimed invention.” *In re Gorman*, 933 F.2d 982, 986, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991). In addition, in order to facilitate review of the obviousness determination, the “analysis should be made explicit.” *KSR International Co., v. Teleflex Inc.*, 127 S.Ct. 1727, 82 USPQ2d 1385, 1396 (2007).

Appellants argue that neither Willemse nor Volpenheim provide any suggestion of carrying out a continuous processs under conditions of backmixing suitable for maintaining within a reaction mixture a level of lower partial fatty acids of polyol that is sufficient to emulsify the reaction mixture as recited in claims 1 and 62 (Br. 9-10), and this deficiency is not resolved by the secondary references (*id.* at 11). We agree, and the rejection is reversed.

The Examiner appears to be relying of Balint '461 for teaching carrying out a continuous processs under conditions of backmixing suitable for maintaining within a reaction mixture a level of lower partial fatty acids of polyol that is sufficient to emulsify the reaction mixture as recited in claims 1 and 62. As to Balint '461, the Examiner states that Balint '461 “describes a process whereby part of the partially esterified material which is produced is returned to the inlet of the circulating pump to be combined with fresh paste [which] appears to be within the scope of the backmixing step claimed in the instant application” (Answer 7), and later reiterates that “[e]xample two . . . describes a process whereby part of the partially esterified material, which is produced is returned to the inlet of the circulating pump to be combined with fresh paste, which is within the scope of the backmixing step claimed in the instant application.” (*Id.* at 10)

Example 2 of Balint '461 describes the preparation of a linear condensation polyester prepared from a polycarboxylic acid (terephthalic acid) and a polyol (ethylene glycol), in which terephthalic acid and ethylene glycol are made into a paste, and fed into the inlet of a circulating pump, where the paste is mixed with 40 parts of recirculating mixture. Balint '461, col. 8, ll. 1-12. The mixture is sent to a heat exchanger, and then to a reactor-separator, where the terephthalate ester, terephthalic acid, glycol-water mixture is split, with part being returned to the inlet of the circulating pump to be mixed with the paste (*i.e.*, the backmixing step). (*Id.* at ll. 17-22.) Thus while Balint '461 may support a conclusion that it would have been obvious to use backmixing in the initial stage of the interesterifying reaction, the Examiner has made no findings as to the level of backmixing, *i.e.*, under conditions for maintaining within said reaction mixture a level of lower partial fatty acid esters of said polyol that is sufficient to emulsify said reaction mixture as recited in claims 1 and 62. Because the Examiner has not made any findings as to that limitation, we are compelled to reverse the rejection.

Moreover, as to claim 1, Appellants argue that “the combination of reaction conditions specified in claim 1 requires that the temperature in the initial stage of the process ranges from 130°C to about 140°C and in the final stages of the process ranges from about 80°C to about 120°C.” (Br. 10). Appellants assert that Willemse and Volpenhein teach away from this limitation, as Willemse at column 3, lines 52-54, discloses raising the temperature “slightly” during the final stage, and Volpenhein teaches at column 5, lines 53-57, that after the excess ester is added to the reaction mixture in stage two, the mixture is heated to about a temperature of from

about 120°C to about 160°C, and does not distinguish between the temperature employed in the reaction steps. (Br. 10-11.)

The Examiner responds by asserting that the argument is “not persuasive since the temperature ranges used in the initial and final stages of the Willemse and Volpenhein references covers at least part of the temperature ranges in the initial and final stages of the instant claims. No significant change to the product as a result of the temperatures used to carry out the instant process has been noted when compared to the product obtained using the process of the prior art.” (Answer 9.)

Step (d) of claim 1 requires the temperature in the initial stage of the process to range from about 130°C to about 140°C, and in the final stages of the process to range from about 80°C to about 120°C. Thus, as there is no overlap in the two ranges, claim 1 requires that the temperature be lowered from the initial stages of the process to the final stages of the process. Thus the issue is not whether the temperature ranges taught by Willemse and Volpenhein overlap with those of claim 1, but whether, after reading the references as a whole, the ordinary artisan would lower the temperature of the reaction at least 10°C when moving from the initial stages of the process to the final stages of the process.

Willemse teaches that “[b]oth stages of the transesterification reaction can suitably be carried out at a similar temperature which normally lies within the range from 100° to 180°C,” but that “[i]t has been found of advantage to raise slightly the temperature during stage (2) of the reaction” (col. 3, ll. 50-54). Willemse therefore would not indicate to the ordinary artisan that the temperature be lowered at least 10°C when proceeding from stage (1) to stage (2), as required by claim 1. Similarly, Volpenhein teaches

that in step 1, the mixture is heated to a temperature within the range of from about 110°C to about 180°C, preferably from about 130°C to about 145°C (col.5, ll. 33-38). In step 2, the mixture is heated from a temperature of from about 120°C to about 160°C, preferably about 135°C (col. 5, ll. 53-57). Moreover, as taught by Volpenhein, the steps 1 and 2 may be combined into a single reaction step, wherein the mixture is heated to about 100°C to 180°C (col. 6, ll. 6-19). Thus, there is nothing in Volpenhein that would indicate that the temperature should be lowered at least 10°C from step 1 to step 2 as required by claim 1.

#### CONCLUSION

In summary, because the Examiner has not set forth a *prima facie* case of obviousness, we are compelled to reverse the rejection.

REVERSED

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THE PROCTER & GAMBLE COMPANY  
INTELLECTUAL PROPERTY DIVISION - WEST BLDG.  
WINTON HILL BUSINESS CENTER - BOX 412  
6250 CENTER HILL AVENUE  
CINCINNATI OH 45224